

COMPOSITION AND SCATTERING PROPERTIES OF COMETARY DUST BASED ON REMOTE SENSING M.S.Hanner (JPL/Caltech)

Comets formed in the cold, outer solar nebula where intact interstellar grains could have been preserved. Yet, there are distinct spectral differences between cometary and interstellar grains. Comets apparently originate from two reservoirs. New and long-period comets originally formed in the region of the giant planets, while short-period comets formed in the Kuiper belt beyond 30 AU. Differences in the composition of these two classes of comets may reflect temperature gradients and the extent of radial mixing in the solar nebula.

In recent years, there has been substantial progress in infrared spectroscopy of comets. The 3 μm region contains the spectral signature of organic materials, while emission from small silicate grains appears in the 10 μm region. Several comets display the 11.2 μm spectral feature of crystalline olivine grains, indicating that the grains either formed at high temperature or subsequently were subjected to strong heating.

The scattering properties of the dust (polarization, phase curve, color) are influenced primarily by grain size and physical structure and have to be interpreted in terms of the scattering properties of irregular particles.

The heterogeneity among comets and the implications for processes in the solar nebula will be discussed.